# THE EXPLOSIVES ENGINEER

*National Safety Competition of 1960*

JULY-AUGUST 1961 VOLUME 39 NUMBER 4

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# in Southern Underground
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# THE EXPLOSIVES ENGINEER

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Forerunner of Progress in Mining, Quarrying, Construction


The announcement by the Federal Bureau of Mines of the six winners in the 1960 National Safety Competition and their accident records shows that the employes of the 675 participating mines and quarries worked almost 128 million man-hours. During this man-hour exposure 2,409 disabling work injuries were experienced, of which 53 resulted in fatalities.

Perhaps the outstanding achievement of the 1960 competition was the new record number of operations that concluded the contest year without a disabling work injury—294, or 43.6% of the participants. Competitors with perfect safety records worked a total of over 26 million man-hours. Perfect safety records were achieved in every group except in underground anthracite mining. The quarry group had 200 operations with perfect safety records during the 1960 competition.

The increasing number of operations with perfect safety records is proof of the effectiveness of the National Safety Competition in making the employes conscious of the hazards encountered in the mineral industries and of their determination to work safely.

The competition, held annually, is conducted by the U. S. Bureau of Mines and sponsored by THE EXPLOSIVES ENGINEER. A Sentinels of Safety trophy and a safety flag are presented to the winner in each group.

John C. Machisak, chief, Branch of Accident Analysis, Division of Safety, Bureau of Mines, gives a resumé of the 1960 competition. His report starts on page 103.

° ° °

Florida is booming. With an estimated weekly increase of 3,000 families, its population is booming; consequently, its building industry, especially housing, is booming.


EDITORIAL STAFF: JAMES J. O'NEILL, *Editor*; THOMAS E. MILLER, *Associate Editor*; GERTRUDE A. DONNELLY, *Associate Editor*; EDWARD L. GRANT, *Art Editor*; HOWARD B. DICKSON, *Production Manager*; A. J. ACKERMAN, *Advertising Manager*; MONTGOMERY R. BUDD, *Director*.

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**Views and opinions expressed by the authors of articles in this publication are their own, and they do not necessarily represent those of the publisher.**


Many of the newcomers to the state are retirees who journey to Florida to enjoy the sun and water; many others are in the younger group who have found employment in Florida's rapidly expanding industry and are now earning a living while enjoying a semitropical paradise and the pleasant life that goes with such a climate.

One of the large developments catering to both groups is the Flor-a-mar project being built by the Sumner Sollitt Company. Located on U. S. 19, on the Gulf of Mexico about 20 miles north of Clearwater, the more than 3,000 acres of coastal land will, when fully developed, contain over 10,000 homes designed for pleasant living. Plans also call for hotels, motels, garden apartments, shopping centers, recreational facilities, and yacht clubs.

Aside from the homes and auxiliary buildings, the major work includes the construction of 60 miles of canals. The building of this extensive canal system required the use of explosives in rather heavy charges to pulverize the hard limestone, which was then excavated by large draglines.

For an interesting and informative article by C. F. Argo on how "Explosives Help to Speed Fun in the Sun" turn to page 115.

° ° °

The No. 2 Mine of Youghiogheny and Ohio Coal Company located at Van, West Virginia, is in the Coalburg seam. The Coalburg seam ranges in height from 8 to 10 ft., which makes the No. 2 Mine operation unique because most of the high-seam coal in this area was worked out many years ago.

A seam of this height permits the use of large mining equipment which usually results in more efficient operations. W. E. Craigo, in his article "Mining in the Coalburg Seam," starting on page 120, tells of the mining procedure in use at the mine and details the drilling and blasting practices that have worked out satisfactorily.

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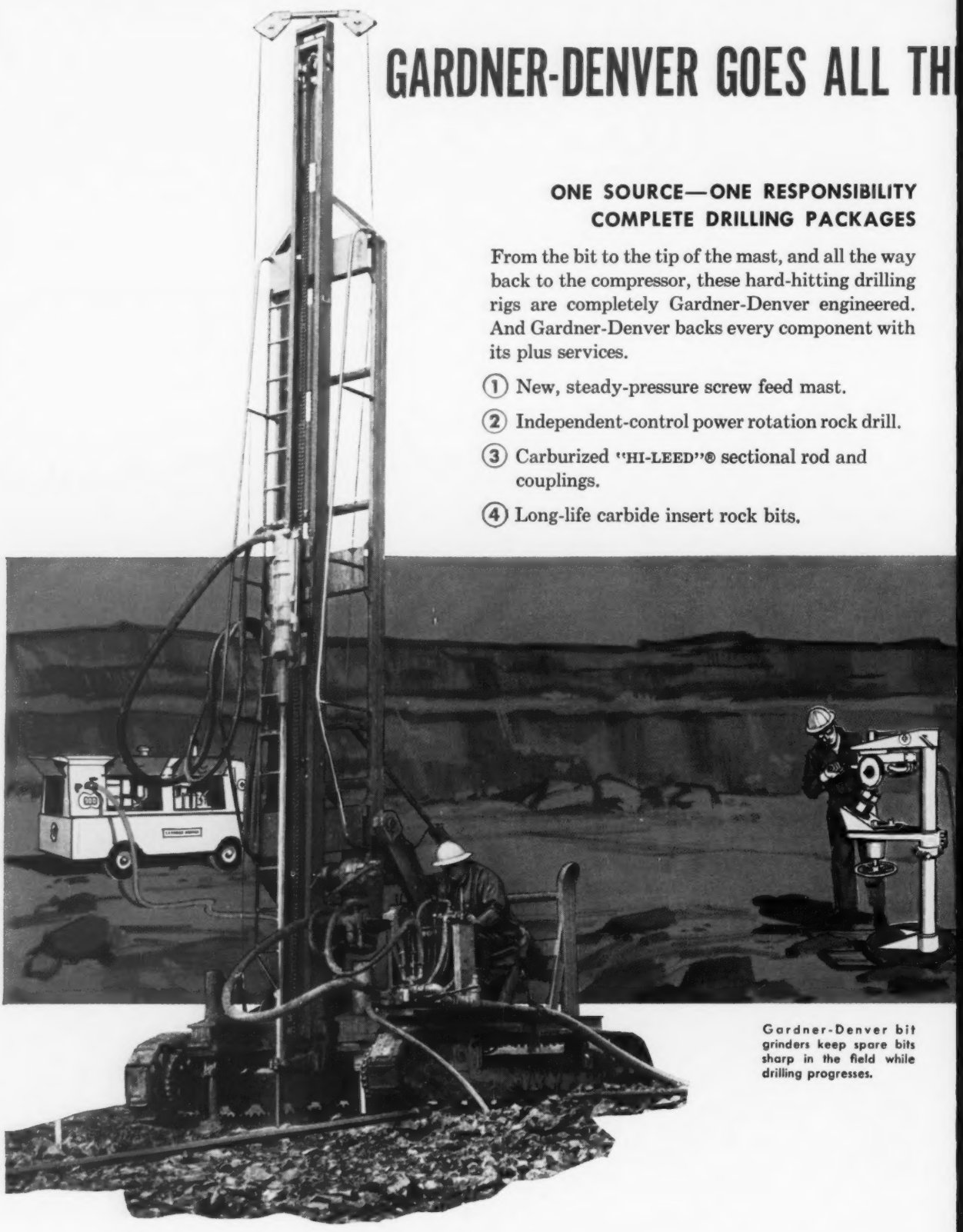

Gardner-Denver bit grinders keep spare bits sharp in the field while drilling progresses.

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⑩ Sturdy mast takes 30′ steel changes.

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# H. Stuart Harrison

PRESIDENT AND CHIEF EXECUTIVE OFFICER

THE CLEVELAND-CLIFFS IRON COMPANY

## A Biography

SEVERAL famous industrialists have achieved eminence in Wall Street following a lowly beginning in the iron and steel industry, but it is rare to find one who rises to the top in the industry from a modest start in The Street. H. Stuart Harrison, president and chief executive officer of The Cleveland-Cliffs Iron Company, arrived at his present position after a rather ambivalent start. Graduating from Yale in 1932, not a particularly propitious moment to begin work anywhere, he had two main interests: finance, and the steel industry in which his father was an executive of the former Corrigan McKinney Steel Company of Cleveland, now Republic Steel Company. Stu, as he is known to his associates, took his first job in the open-hearth and rolling mills of his father's company, but after a year there he left to try the concrete canyons of Wall Street.

His first job was with the Central Hanover Bank & Trust Company as a runner in the trust department. "Runner" is the slightly more dignified name given by Wall Streeters to their delivery boys. They shuttle the stocks, bonds, and other securities between the financial houses, and to and from the stock clearing house. Central Hanover did not keep its runner with a Phi Beta Kappa key literally on the street very long, but even so, advancement failed to hold him. In 1936, he left the bank to join Lionel D. Edie & Company, economic consultants, who put him to forecasting the ups and downs of the iron and steel industry, and in short order he became head of the heavy-industries group. Looking back, Stu says he liked this—salaries were good because after the long bear market and the hammering from the New Deal, Wall Street found few young men who were making finance their lifetime careers. But though Wall Street was attractive, the iron and steel industry still was calling. Cleveland-Cliffs offered him an enviable position in its finance division. Here, too, he would endeavor to follow the swings of iron ore and the company's security holdings in the industry, and so he left Wall Street for Cleveland-Cliffs in 1937.

His new employers advanced him rapidly. He was appointed assistant treasurer in 1940, treasurer in 1945, vice president and treasurer in 1952, director in 1957, executive vice president in 1958, and president in 1960.

One of his greatest concerns is the tax problem facing his industry. Mr. Harrison says: "The iron ore industry has complained so long that it is hard for people to make up their minds about iron ore taxes. Yet, today, iron ore competition is so keen that the solution to the problem will require the full cooperation and understanding of labor, management, the political leaders of the state, and the people of the range communities."

Mr. Harrison's business interests have not been confined solely to Cleveland-Cliffs. He is a member of four outside boards: Cleveland Trust Company, Jones & Laughlin Steel Corp., Medusa Portland Cement Corp., and Northwestern Mutual Life Insurance Co.

Mr. Harrison has been active in the community affairs of Cleveland. He has taken a keen interest in the Children's Aid Society, a seventy-five-year-old group which once operated an orphanage, but now maintains a home for emotionally disturbed children. He was president for seven years, and still is on the board.

Some time is devoted to the Cleveland Metropolitan Housing Authority of which he is vice chairman of the board. The authority has twelve projects housing 25,000 people of low incomes, and three additional projects now under construction.

He is a former president of the Board of Trustees of the Fairmount Presbyterian Church, and now is clerk of the Session.

Mr. Harrison is a member of the Cleveland-Yale Scholarship Committee, and a trustee of Cleveland's Laurel School, and of the city's University School.

He is a staunch believer in the value of exercise to keep in good health a man engaged in a somewhat sedentary occupation. He does not take to a pink tea variety of sports; he loves to hunt and shoot duck, quail, and pheasant. His regular regimen, however, of golf, tennis, squash, and even indoor tennis in the winter, provides the physical exertion he feels his mode of life requires.

Mr. Harrison married Suzanne Brookhart of Cleveland in 1943. They live in Shaker Heights, suburb of Cleveland, and have three children: Mary Suzanne, Henry Stuart, Jr., and Virginia Foster.

H. STUART HARRISON

*"Let the worker carry around with him a mental picture of his wife and child, whose happiness depends upon his safe return after the day's work, and these loved ones become his surest sentinels of safety."*

THE EXPLOSIVES ENGINEER
JANUARY, 1925

# *The Winners in 1960*

**ANTHRACITE**

HUBER COLLIERY
GLEN ALDEN CORPORATION
Ashley, Pennsylvania

**BITUMINOUS-COAL**

COLUMBIA MINE
COLUMBIA-GENEVA STEEL DIVISION
UNITED STATES STEEL CORPORATION
Columbia, Utah

**METAL**

JEFFERSON CITY ZINC MINES
TENNESSEE COAL AND IRON DIVISION
UNITED STATES STEEL CORPORATION
Jefferson City, Tennessee

**NONMETALLIC**

JONATHAN MINE
COLUMBIA CEMENT CORPORATION
Zanesville, Ohio

**OPEN-PIT**

MONROE NUMBER 12 MINE
OLIVER IRON MINING DIVISION
UNITED STATES STEEL CORPORATION
Chisholm, Minnesota

**QUARRY**

CALCITE QUARRY
MICHIGAN LIMESTONE DIVISION
UNITED STATES STEEL CORPORATION
Rogers City, Michigan

# THE NATIONAL SAFETY COMPETITION of 1960

## Record number of injury-free operations reported by 675 mines and quarries entered in 1960

JOHN C. MACHISAK*

THE number of participants in the 1960 National Safety Competition equaled the record of 675 established in 1958. Begun in 1925, this safety contest is conducted annually by the Federal Bureau of Mines in cosponsorship with THE EXPLOSIVES ENGINEER, which provides the Sentinels of Safety trophies and the safety banners for the winner of each of the six competitive groups: underground anthracite mines, underground bituminous-coal and lignite mines, underground metal mines, underground nonmetal mines, open-pit mines, and quarries. Rules provide for equitable competition within each group under comparable work hazards.

During the 1960 competition, employes of the 675 participating mines and quarries were exposed for almost 128 million man-hours to the hazards of extracting this Nation's minerals. They suffered 2,409 disabling work injuries in the process—53 of which were fatal—resulting in an overall competition disabling work injury frequency rate of 18.828 per million man-hours. In addition, 548,909 days were lost or charged because of these injuries, resulting in an overall competition severity rate, per million man-hours, of 4,290.135. Both rates were the third lowest recorded since the start of the competition. A lower frequency rate was attained in both 1957 and 1959

**SAFETY MEETING: United Mine Workers Safety Committee, United States Bureau of Mines safety inspector, and company officers of the Huber Colliery, Glen Alden Corporation, meet to discuss accident prevention. Seated, left to right, George Wesley, Huber Mine foreman; Willis Devens, company safety engineer; Jacob Miller, Huber superintendent; Robert Reid, outside foreman; Stanley Pruce, U.M.W. safety committee member. Standing, left to right, Ivor L. Williams, general manager; David Van Fossen, mine foreman; Frank Sorbers, U.M.W. safety director; Charles Jones, Bureau of Mines inspector; and Walter Yacek, U.M.W. safety committee member.**

*Chief, Branch of Accident Analysis
Division of Accident Prevention and Health
Bureau of Mines
U. S. Department of the Interior
Washington, D. C.

with a score of 18.293, and the severity rates of 4,051.244 and 3,871.876 achieved in 1953 and 1955, respectively, were both lower than that of 4,290.135 recorded in 1960.

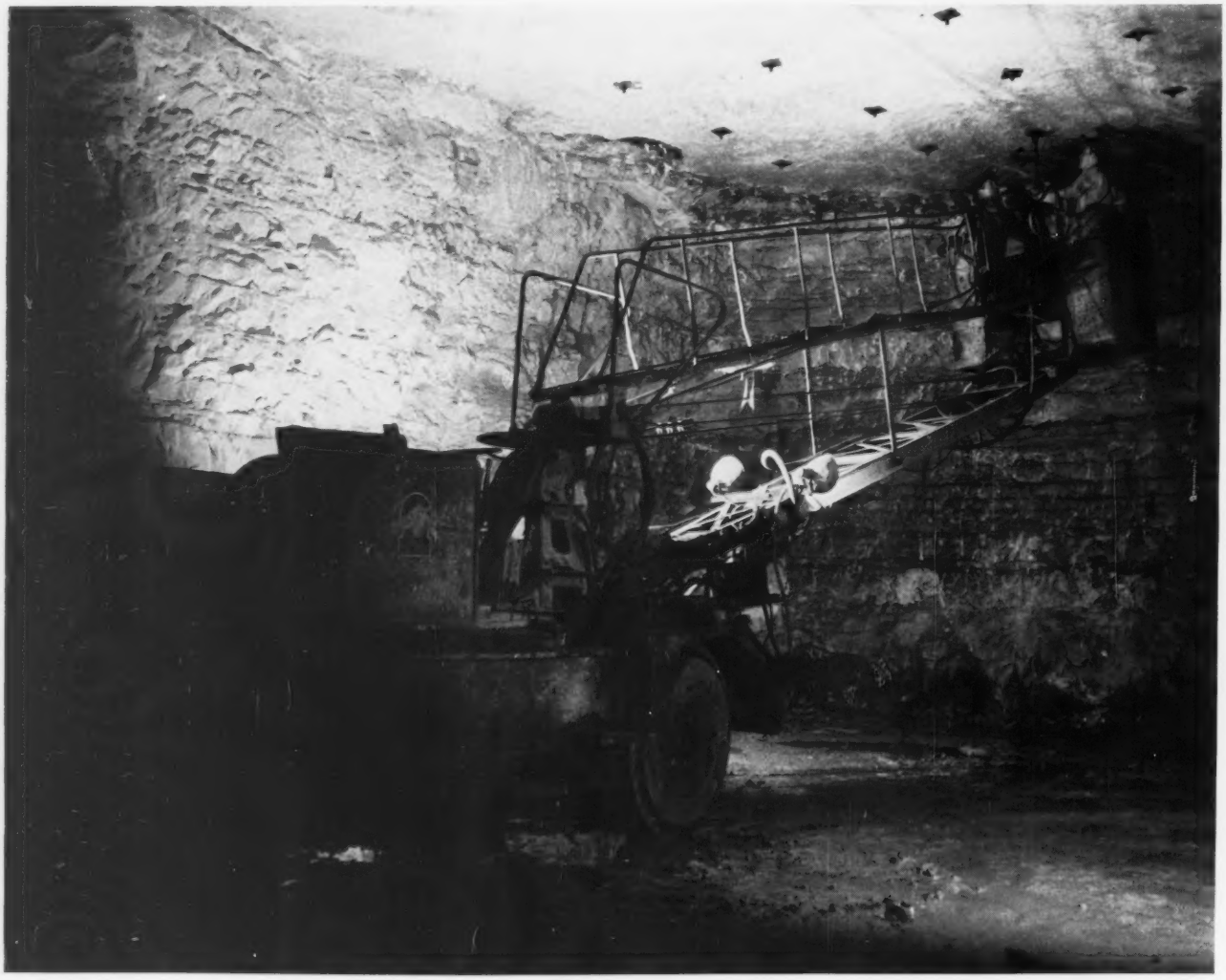
The geographical distribution of participants in the 1960 National Safety Competition provides some idea of its general acceptance as an effective means of promoting safety in the Nation's mineral extractive industries. Participation by major geographical subdivisions was as follows: Middle Atlantic States, 145; South Atlantic States, 136; East North Central States, 127; West North Central States, 91; East South Central States, 70; Mountain States, 39; West South Central States, 31; Pacific States, 26; and New England States, 10. Every state except New Hampshire, Rhode Island, Delaware, and Hawaii was represented. The bulk of the participants—421, or 62.4%—however, came from 10 states. Listed in order of volume, they were: Pennsylvania, 96; West Virginia, 51; Minnesota, 50; Ohio, 42; New York, 39; North Carolina, 32; Illinois, 30; Michigan, 30; Kentucky, 26; and Alabama, 25.

### 294 Injury-Free Participants

The most noteworthy achievement of participants in the 1960 competition was the new record number which succeeded in operating throughout the contest year without a disabling work injury—294, or 43.6% of all participants. Competitors with perfect safety records amassed 26,243,983 man-hours—equivalent to more than 20% of the man-hours accumulated by all participants. Perfect safety records were distributed among the various groups of the 1960 National Safety Competition as follows:

Underground anthracite, none
Underground bituminous-coal and lignite, 14, or 4.8%
Underground metal, 10, or 3.4%
Underground nonmetal, 18, or 6.1%
Open-pit, 52, or 17.7%
Quarries, 200, or 68.0%

More than two perfect safety rec-



ROOF-BOLTING: To make the operation completely safe, Columbia Cement Corporation assigns two men to its roof-bolting. Left to right, George Tracey and Clyde Parks are engaged in this important work.

**LIMESTONE QUARRY: An aerial view of the Calcite Quarry and plant of the Michigan Limestone Division, United States Steel Corporation, at Rogers City, Michigan. The 1960 award marks the seventh time this operation has won the Sentinels of Safety trophy.**

ords out of every three were attained by participants from the quarry group. This division has consistently accounted for a major share of the competition's perfect safety records. The quarry group also achieved the highest ratio of perfect safety records to total number of participants—200 out of 323, or 62%. It was followed by open-pit with 52 out of 117, or 44%; underground nonmetal mines with 18 out of 53, or 34%; underground metal mines with 10 out of 55, or 18%; and underground bituminous-coal mines with 14 out of 117, or 12%.

Across the Nation, however, more than 70% of the injury-free participants were distributed among four geographical areas. Listed in order of volume, they were: South Atlantic States with 63, or 21.4%; East North Central States with 53, or 18%; West North Central States with 50, or 17%; and Middle Atlantic States with 48, or 16.3%.

### Geographic Distribution

The geographic distribution of the 1960 participants, and perfect safety records by geographic area, state, and competitive group, were as follows:

1. The New England States had 10 participants, 8 of which were injury-free, all in the quarry group—1 in Maine, 1 in Vermont, 4 in Massachusetts, and 2 in Connecticut.

2. The Middle Atlantic States recorded 145 participants; 48 of them had perfect records, of which New York had 17—1 in the underground nonmetal group, 1 in the open-pit group, 15 in the quarry group. Pennsylvania had 31 injury-free operations—6 in the underground bituminous-coal and lignite group, 2 in the open-pit

group, and 23 in the quarry group.

3. The East North Central States entered 127 competitors, 53 of whom had perfect records. Of these, Ohio had 24—2 in the underground nonmetal group, 1 in the open-pit group, and 21 in the quarry group; Indiana had 9—1 in the underground nonmetal group and 8 in the quarry group; Illinois had 11—all in the quarry group; Michigan had 8—1 in the underground metal group, 1 in the underground nonmetal group, 2 in the open-pit group, and 4 in the quarry group; and Wisconsin had 1 injury-free operation in the quarry group.

4. The West North Central States had 91 participants, 50 of which achieved perfect safety records, distributed as follows: Minnesota had 22—1 in the underground metal group, 20 in the open-pit group, and 1 in the quarry group; Iowa had 12—1 in the underground nonmetal group, 1 in the open-pit group, and 10 in the quarry group; Missouri had 10—6 in the underground nonmetal group, 1 in the open-pit group, and 3 in the quarry group; Nebraska had 2—both in the quarry group; and Kansas had 4—all in the quarry group.

5. The South Atlantic States recorded 136 competitors, 63 of which had perfect safety records and were distributed by groups among the following states: Maryland had 5—all quarries; Virginia had 13—2 in the underground nonmetal group, 1 in the open-pit group, and 10 in the quarry group; West Virginia had 10—3 in the underground bituminous- and lignite-coal group, 1 in the underground nonmetal group, 2 in the open-pit group, and 4 in the quarry group; North Carolina had 21—1 in the open-pit group and 20 in the quarry group; South Carolina had 1 in the quarry group; Georgia had 4—1 in the underground nonmetal group, 1 in the open-pit group, and 2 in the quarry group; Florida had 9—7 in the open-pit group and 2 in the quarry group.

6. The East South Central States provided 70 participants, 29 of which were injury-free and were distributed as follows: Kentucky had 6 perfect safety records—5 in the quarry group and 1 in the open-pit group; Tennessee had 11—6 in the underground metal group, 4 in the quarry group, and 1 in the open-pit group; Alabama also had 11—5 in the quarry group, 2 in the underground bituminous-coal group, 3 in the open-pit group, and 1 in the underground metal group; and Mississippi had 1 in the quarry group.

7. The West South Central States had 31 competitors, 10 of which had perfect safety records, of which Texas had 8—6 in the quarry group and 2 in the open-pit group; Arkansas and Louisiana had 1 in the open-pit group and 1 in the underground nonmetal group, respectively.

8. The Mountain States recorded 39 participants, 16 of which were injury-free, of which Utah had 5—3 in the quarry group and 1 each in the underground bituminous-coal and lignite and open-pit groups; Colorado, 4—2

**SHIFT CHANGE: Like a crowded New York subway is the shift change at U. S. Steel's Columbia Mine near Dragerton, Utah, as some miners leave and others arrive for work. Miners ride to and from the mine interior in all-steel man cars, providing both safety and convenience.**

**DAY SHIFT: Shown here are miners of the day shift with the mill, surface, and shop crews of the Jefferson City Zinc Mines, Tennessee Coal and Iron Division of United States Steel Corporation.**

in quarries and 1 each in underground bituminous-coal and open-pit; Montana, 2 – both in quarries; Wyoming, 2–1 in underground bituminous-coal and 1 in open-pit; Idaho had 1 in open-pit; Nevada and New Mexico each had 1 in quarries.

9. The Pacific States provided 26 participants, 17 of which had perfect safety records. California had 10 – 8 in quarries and 1 each in underground nonmetal and open-pit; Washington had 4–3 in quarries and 1 in underground metal; and Oregon had 3–all in quarries.

The increasing volume of perfect safety records clearly indicates this annual competition's ability to capture and hold the interest of employes and officials in accident-prevention work.

### 1960 Winners

Top safety honors in the six group classifications of the 1960 National Safety Competition were won by the following participants in each group:

Anthracite mines, underground: Huber Colliery, Ashley, Luzerne County, Pennsylvania (Glen Alden Corporation).

Bituminous-coal mines, underground: Columbia Mine, Columbia, Carbon County, Utah (Columbia-Geneva Steel Division, U. S. Steel Corporation).

Metal mines, underground: Jefferson City Zinc Mines, Jefferson City, Jefferson County, Tennessee (Tennessee Coal and Iron Division, U. S. Steel Corporation).

Nonmetal mines, underground: Jonathan Mine, Zanesville, Muskingum County, Ohio (Columbia Cement Corporation).

Open-pit mines: Monroe No. 12 Mine, Chisholm, St. Louis County, Minnesota (Oliver Iron Mining Division, U. S. Steel Corporation).

Quarries: Calcite Quarry, Rogers City, Presque Isle County, Michigan (Michigan Limestone Division, U. S. Steel Corporation).

All winners were confirmed unanimously by the Committee of Award,

## SALIENT FEATURES OF THE NATIONAL SAFETY COMPETITION

### 1960

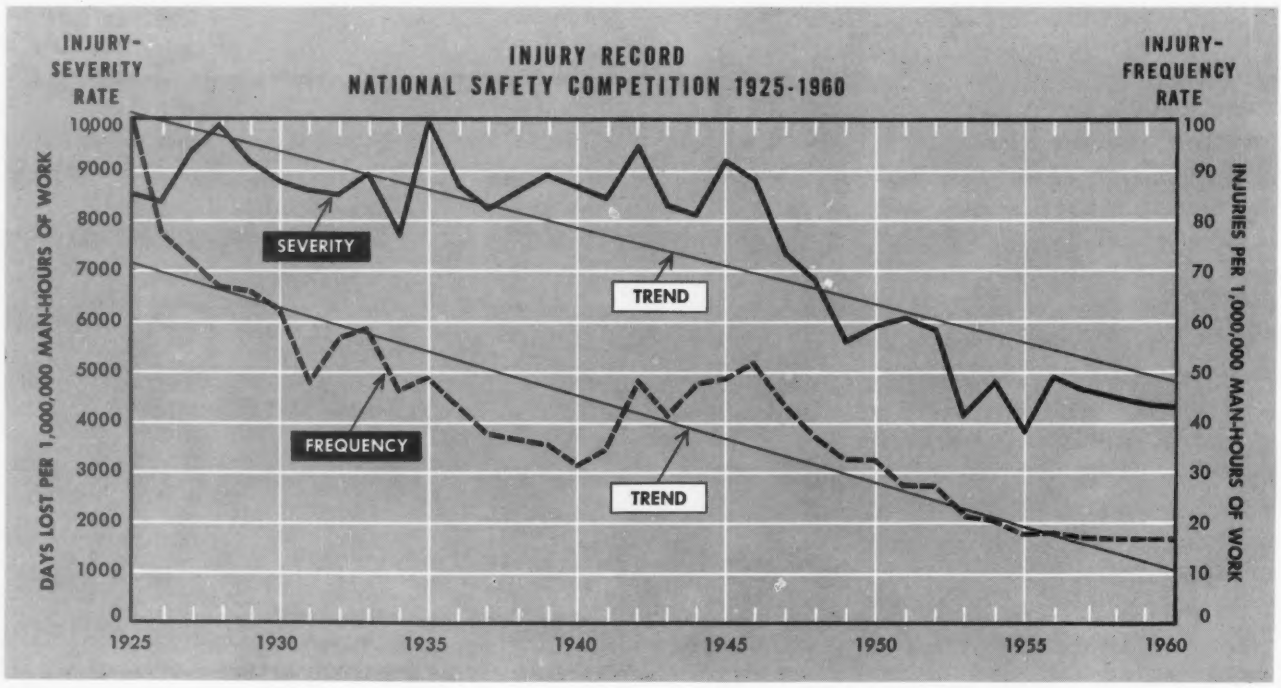
| *Type of mine* | *Number of mines* | *Man-hours* | *Fatal injuries* | *Nonfatal injuries* | *Total injuries* | *Days of disability* | *Frequency rate* | *Severity rate* |
|---|---|---|---|---|---|---|---|---|
| Anthracite | 10 | 4,268,389 | 7 | 352 | 359 | 53,393 | 84.107 | 12,508.935 |
| Bituminous-coal | 117 | 37,118,278 | 19 | 876 | 895 | 235,115 | 24.112 | 6,334.211 |
| Metal | 55 | 20,884,412 | 11 | 464 | 475 | 108,539 | 22.744 | 5,197.130 |
| Nonmetallic mineral | 53 | 7,965,229 | 1 | 126 | 127 | 12,882 | 15.944 | 1,617.279 |
| Total | 235 | 70,236,308 | 38 | 1,818 | 1,856 | 409,929 | 26.425 | 5,836.426 |
| Open-pit | 117 | 32,583,172 | 8 | 251 | 259 | 68,415 | 7.949 | 2,099.703 |
| Quarries | 323 | 25,127,312 | 7 | 287 | 294 | 70,565 | 11.700 | 2,808.299 |
| Grand total | 675 | 127,946,792 | 53 | 2,356 | 2,409 | 548,909 | 18.828 | 4,290.135 |

## THE 36-YEAR HISTORY OF THE NATIONAL SAFETY COMPETITION

### 1925-1960

(CUMULATIVE FIGURES)

| *Type of mine* | *Man-hours* | *Fatal injuries* | *Nonfatal injuries* | *Total injuries* | *Days of disability* | *Avg. Frequency rate* | *Avg. Severity rate* |
|---|---|---|---|---|---|---|---|
| Anthracite | 675,392,986 | 795 | 58,715 | 59,510 | 7,060,251 | 88.112 | 10,453.545 |
| Bituminous-coal | 1,655,035,420 | 1,554 | 64,731 | 66,285 | 14,784,849 | 40.051 | 8,933.252 |
| Metal | 663,684,877 | 500 | 22,034 | 22,534 | 4,400,859 | 33.953 | 6,630.947 |
| Nonmetallic mineral | 186,141,502 | 101 | 4,776 | 4,877 | 905,142 | 26.200 | 4,862.656 |
| Total | 3,180,254,785 | 2,950 | 150,256 | 153,206 | 27,151,101 | 48.174 | 8,537.398 |
| Open-pit | 488,894,122 | 127 | 6,751 | 6,878 | 1,238,332 | 14.068 | 2,532.925 |
| Quarries | 652,679,706 | 289 | 11,283 | 11,572 | 2,644,653 | 17.730 | 4,051.992 |
| Grand total | 4,321,828,613 | 3,366 | 168,290 | 171,656 | 31,034,086 | 39.718 | 7,180.777 |



**TEAM: Pictured are members of the Columbia Cement Mine Rescue Team and their instructors. Left to right, two instructors from the Bureau of Mines, David Searls, James Shipley, Harry Rose, Clyde Parks, Billie Alexander, Robert Jones, the captain, and Fred Gaskins, chief instructor of the U. S. Bureau of Mines of Athens, Ohio. This team has been training for approximately two years.**

members of which are among the Nation's outstanding leaders in the field of industrial accident prevention. The composition of the 1960 National Safety Competition Committee of Award was:

Ronald R. McNaughton, President, American Institute of Mining, Metallurgical, and Petroleum Engineers; Manager, Metallurgical Division, The Consolidated Mining and Smelting Company of Canada, Ltd., Trail, B. C., Canada.

G. Donald Kennedy, President, Portland Cement Association, 33 West Grand Avenue, Chicago 10, Illinois.

Howard Pyle, President, National Safety Council, 425 North Michigan Avenue, Chicago 11, Illinois.

Charles Ferguson, Director, Safety Division, United Mine Workers of America, 1435 K Street, N. W., Washington 5, D. C.

Raymond E. Salvati, President, American Mining Congress, Island Creek Coal Company, P. O. Box 2132, Huntington 18, West Virginia.

Hugo E. Johnson, President, American Iron Ore Association, 600 Bulkley Building, Cleveland 15, Ohio.

Stephen F. Dunn, President, National Coal Association, 1130 17th Street, N. W., Washington 6, D. C.

It is interesting to point out that four of the six Sentinels of Safety trophies were won by various mineral enterprises of the U. S. Steel Corporation; the winners represented the bituminous-coal, metal, open-pit, and quarry groups.

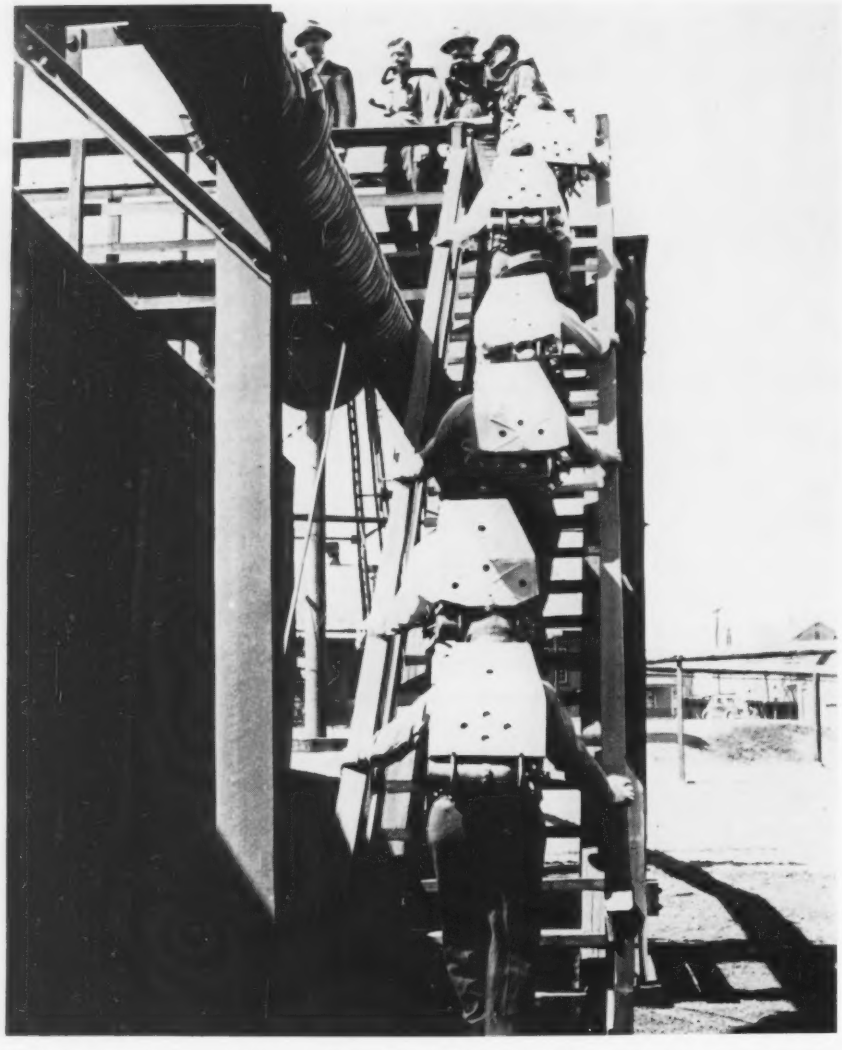
The winning mineral operation in each group is awarded a bronze Sentinels of Safety trophy and a Sentinels of Safety flag, both of which are provided by THE EXPLOSIVES ENGINEER, in recognition of the best safety record in its group. In addition, every employe and official of the six winning operations receives a Certificate of Accomplishment in Safety from the Bureau of Mines in recognition of his

part in compiling the trophy-winning record. Certificates of Achievement in Safety are awarded to the mineral operations placing second, third, fourth, and fifth in each group, as well as to all participants amassing 30,000 or more man-hours during the competitive year without a disabling work injury.

### Anthracite Mines

The Huber Colliery of Glen Alden Corporation at Ashley, Luzerne County, Pennsylvania, achieved top safety honors in the first year of participation in the underground anthracite group of the National Safety Competition. In 1960, the employes of this colliery worked 763,202 man-hours and had 77 disabling work injuries which caused an aggregate time loss of 1,329 days. This represented a disabling injury-severity rate of 1,741.348 days lost per million man-hours, the best eligible record in the anthracite group.

A review shows the 1960 injury experience of this class was less favorable than in 1959. As a group, the ten participating mines had a frequency rate of 84.107 injuries per million man-hours, substantially higher than that of 51.910 recorded in 1959. The group's average injury-severity rate of 12,508.935 was the highest since 1957, when 50,544 days were lost through 313 injuries. The injury-frequency rate of 84.107, however, was lower than this category's 36-year average rate of 88.112.



**TRAINEES: Mine-rescue trainees of the Huber Colliery, Glen Alden Corporation, practice with their 2-hour self-contained breathing apparatus at the company's central mine-rescue station.**

### Bituminous-Coal Mines

For the first time in 13 years of participation, the Columbia Mine of Columbia-Geneva Steel Division of U. S. Steel Corporation at Columbia, Carbon County, Utah, was awarded the Sentinels of Safety trophy and flag for the best safety record among bituminous-coal mines competing in 1960. It operated throughout the year without a disabling work injury, while accumulating a total of 463,253 man-hours. During the 13 years of participation, this mine amassed 6,895,979 man-hours for an overall record of 15.806 injuries per million man-hours and 3,899.084 days lost per million man-hours of exposure to the hazards of underground bituminous-coal mining. The mine's 13-year rates are well below this group's 36-year frequency and severity rates of 40.051 and 8,933.252, respectively, and also below the corresponding rates of 24.112 and 6,334.211 recorded by all 117 competitors in this group during 1960.

The average severity rate of 6,334.211 for the 117 participants in this class was higher than that of 6,260.704 recorded in 1959, but substantially below the 36-year overall corresponding rate of 8,933.252. The injury-frequency rate of 24.112 per million man-hours of exposure to hazards was also higher than that of 23.428 for 1959 but substantially lower than the 36-year overall rate of 40.051 for this group.

### Metal Mines

The Jefferson City Zinc Mines of Tennessee Coal and Iron Division, U. S. Steel Corporation, at Jefferson City, Jefferson County, Tennessee, won the trophy in the group of underground metal mines. The 1960 award

**SCREEN HOUSE: Michigan Limestone's Calcite screen house and a portion of the "A" conveyor, open-hearth storage.**

was the first this mine won in seven consecutive years of participation in this group. It was a close contender for the trophy in 1956 and 1955, when it received a Certificate of Achievement in Safety for ranking second and third, respectively. In 1960, this mine was operated 318,725 man-hours without a disabling work injury. During its seven years of participation, its employes have worked 2,164,736 man-hours and had nine disabling work injuries which caused a loss of 541 days. During this time, it has recorded average injury-frequency and severity rates of 4.158 and 249.915, respectively.

The 55 underground metal mines enrolled in the 1960 competition were operated 20,884,412 man-hours. The injury-frequency rate of 22.744 was 11% below that of 25.505 for 1959 and 33% below the 36-year rate of 33.953 recorded for this group of the competition. The average severity rate recorded by participants of this group was 5,197.130, 14% below that of 6,057.435 in 1959, and 22% below the group's 36-year overall average rate of 6,630.947.

### Nonmetallic Mines

The winning contestant among underground mines producing nonmetallic minerals was the Jonathan Mine of Columbia Cement Corporation at Zanesville, Muskingum County, Ohio. This limestone mine, with an aggregate worktime of 698,930 man-hours, had no disabling work injuries during 1960. The Jonathan Mine has been a continuous participant in the National Safety Competition since 1951, during which time it has been operated 1,763,409 man-hours with only one disabling work injury that caused 111 days of disability. The records show that it has received Certificates of Achievement in Safety for outstanding safety performances in eight of its ten participating years, an enviable record of safety in operations.

As a group, the nonmetallic mines had a better safety record in 1960 than in 1959. Its injury-severity rate of 1,617.279 per million man-hours of work was 49% lower than that in 1959. The frequency of injuries among its participants decreased 18%, from 19.346 in 1959 to 15.944 in 1960.

### Open-Pit Mines

After only three years of participation in the National Safety Competition, the Monroe No. 12 Mine of Oliver Iron Mining Division, U. S. Steel Corporation, at Chisholm, St. Louis County, Minnesota, was the winner of the Sentinels of Safety trophy in the open-pit group. This open-pit iron-ore mine worked 518,046 man-hours without a disabling work injury. During the three years this mine has participated, it has accumulated a total worktime of 1,511,447 man-hours with only six disabling work injuries. The volume of participants in this group in 1960 was the third largest in the 36-year history of the competition. The group severity rate, 2,099.703 days lost per million man-hours of exposure in 1960, was slightly higher, but its frequency rate of 7.949 injuries per million man-hours of exposure was 7% lower than the corresponding rate in 1959.

**CONFERENCE: "Here's how we can do even better," says Joe Harvey (seated), superintendent of U. S. Steel's award-winning Columbia Mine, as he points out new goals to (left to right) Hugh Behling, Byrd Gordon, and Joe Merchant, members of the Columbia Mine Safety Committee. The mine worked 463,253 man-hours without a disabling injury.**

The overall safety record for the 117 mines in this category in 1960 was a decided improvement over the group's 36-year record. The group's 1960 frequency rate was the lowest since 1938, while its severity rate, though higher than that recorded in 1959, was considerably lower than that of 1958.

### Quarries

Top honors among all quarry participants in the 1960 National Safety Competition went to the Calcite Quarry of Michigan Limestone Division, U. S. Steel Corporation, at Rogers City, Presque Isle County, Michigan. It was awarded the Sentinels of Safety trophy for aggregating 983,750 man-hours of exposure without a disabling work injury during the 1960 competitive year.

This is the seventh time this quarry has won the coveted Sentinels of Safety trophy in its 33 years of continued enrollment as a contestant. During these years, the quarry has amassed a total of 33,641,208 man-hours, while recording only 51 disabling work injuries. When compared with the 36-year record of all participants in the quarry group, the Calcite Quarry's 33-year record is outstanding and worthy of special note. Its 33-year frequency rate is 1.516 as compared with the 36-year quarry group rate of 17.730, and its severity rate for this same period is 1,702.733 as compared with the group's 36-year total rate of 4,051.992. This record of continued safety performance clearly demonstrates the effectiveness of the National Safety Competition when used in conjunction with a well-planned and properly administered safety program to prevent the occurrence of disabling work injuries.

The group frequency rate of 11.700, although 4.4% lower than the 1959 rate of 12.232, was the lowest since 1955. This improvement, however, was offset by a somewhat higher severity rate

of 2,808.299, which was 2.4% above that of 2,743.317 recorded in 1959. Both rates recorded for this group during 1960 were considerably below their respective 36-year averages of 17.730 and 4,051.992.

Any underground mine, open-pit, or quarry in the United States is eligible to participate in the National Safety Competition conducted annually by the Bureau of Mines. Contest rules and application blanks may be obtained from the Branch of Accident Analysis, Bureau of Mines, U. S. Department of the Interior, Washington 25, D. C., or from any one of the following field offices of the Bureau:

Alaska Office of Mineral Resources, Region I, Bureau of Mines, U. S. Department of the Interior, P. O. Box 2688, Juneau, Alaska.

Division of Mineral Resources, Region I, Bureau of Mines, U. S. Department of the Interior, P. O. Box 492, Albany, Oregon.

Division of Mineral Resources, Region II, Bureau of Mines, U. S. Department of the Interior, 420 Custom House, 555 Battery Street, San Francisco 11, California.

Division of Mineral Resources, Region III, Bureau of Mines, U. S. Department of the Interior, Building 20, Denver Federal Center, Denver 25, Colorado.

Division of Mineral Resources, Region IV, Bureau of Mines, U. S. Department of the Interior, 206 Federal Building, Bartlesville, Oklahoma.

Pittsburgh Office of Mineral Resources, Region V, Bureau of Mines, U. S. Department of the Interior, 4800 Forbes Avenue, Pittsburgh 13, Pennsylvania.

Knoxville Office of Mineral Resources, Region V, Bureau of Mines, U. S. Department of the Interior, 404 Hamilton Bank Building, Knoxville 2, Tennessee.

Minneapolis Office of Mineral Resources, Region V, Bureau of Mines, U. S. Department of the Interior, East 58th Street at Mississippi River, Minneapolis 17, Minnesota.

**OPEN-PIT: A general view of Oliver Iron's Monroe No. 12 Mine at Chisholm, Minnesota. In the foreground is a diesel locomotive hauling six 40-yd. cars of iron ore. Two electric shovels are shown in the background.**

Director, Anthracite Research Center, Bureau of Mines, U. S. Department of the Interior, Schuylkill Haven, Pennsylvania.

**SELF-LOADER: Jefferson City Zinc Mines' self-loading transport loads zinc ores.**

# Awards of Certificates of Achievement In Safety — 1960

RULES of the competition provide for the award of Certificates of Achievement in Safety to each mine or quarry, other than the trophy winners, which ranked second, third, fourth, and fifth in its respective group. The mines and quarries are listed below, together with the man-hours each amassed during the contest year.

Certificates are awarded also to each disabling injury-free mine or quarry that worked 30,000 or more man-hours during the 12 consecutive months of each contest.

### ANTHRACITE MINES

Good Springs Mine, Good Springs, Schuylkill County, Pennsylvania, operated by Penag Coal Company, 167,692 man-hours with 10 disabling work injuries causing 323 days of disability. Disabling injury-severity rate was 1,741.348 per million man-hours.

Sugar Notch Colliery, Sugar Notch, Luzerne County, Pennsylvania, operated by Glen Alden Corporation, 222,444 man-hours with 27 disabling work injuries causing 468 days of disability. Disabling injury-severity rate was 2,103.900 per million man-hours.

Tremont Mine, Tremont, Schuylkill County, Pennsylvania, operated by Herb and Reed Coal Company, 56,986 man-hours with 2 disabling work injuries causing 160 days of disability. Disabling injury-severity rate was 2,807.707 per million man-hours.

Woodward Colliery, Edwardsville, Luzerne County, Pennsylvania, operated by Glen Alden Corporation, 289,531 man-hours with 26 disabling work injuries causing 924 days of disability. Disabling injury-severity rate was 3,191.368 per million man-hours.

### BITUMINOUS-COAL MINES

Montcoal No. 1 Mine, Montcoal, Raleigh County, West Virginia, operated by Armco Steel Corporation, 362,508 man-hours without a disabling work injury.

Short Creek Mine, Adamsville, Jefferson County, Alabama, operated by Tennessee Coal and Iron Division, U. S. Steel Corporation, 354,880 man-hours without a disabling work injury.

Maple Creek Mine, New Eagle, Washington County, Pennsylvania, operated by United States Steel Corporation, 260,645 man-hours without a disabling work injury.

No. 6 Mine, Gary, McDowell County, West Virginia, operated by United States Steel Corporation, 252,169 man-hours without a disabling work injury.

### METAL MINES

Boyd Mine, Ducktown, Polk County, Tennessee, operated by Tennessee Copper Company, 237,295 man-hours without a disabling work injury.

Armour No. 2 Mine, Ironton, Crow Wing County, Minnesota, operated by Inland Steel Company, 227,888 man-hours without a disabling work injury.

Calloway Mine, Ducktown, Polk County, Tennessee, operated by Tennessee Copper Company, 206,207 man-hours without a disabling work injury.

Edwards Mine, Bessemer, Jefferson County, Alabama, operated by Republic Steel Corporation, 148,538 man-hours without a disabling work injury.

### NONMETALLIC MINES

Jefferson Island Mine, Jefferson Island, Iberia County, Louisiana, operated by Jefferson Island Salt Division, Diamond Crystal Salt Company, 467,026 man-hours without a disabling work injury.

Mississippi Mine, Ste. Genevieve, Ste. Genevieve County, Missouri, operated by Mississippi Lime Company, 195,043 man-hours without a disabling work injury.

Grand Rapids Mine, Grand Rapids, Kent County, Michigan, operated by Bestwall Gypsum Company, 179,770 man-hours without a disabling work injury.

Ironton Mine, Ironton, Lawrence County, Ohio, operated by Alpha Portland Cement Company, 160,528 man-hours without a disabling work injury.

### OPEN-PIT MINES

Iron Mountain and Desert Mound Mines, Cedar City, Iron County, Utah, operated by Columbia Iron Mining Company, U. S. Steel Corporation, 498,314 man-hours without a disabling work injury.

Orange Park Mine, Lakeland, Polk County, Florida, operated by American Cyanamid Company, 439,278 man-hours without a disabling work injury.

Sydney Mine, Sydney, Hillsborough County, Florida, operated by American Cyanamid Company, 402,448 man-hours without a disabling work injury.

Hunner Mine, Coleraine, Itasca County, Minnesota, operated by Hanna Iron Ore Division, National Steel Corporation, 383,289 man-hours without a disabling work injury.

### QUARRIES

Cedarville Quarry, Cedarville, Mackinac County, Michigan, operated by Michigan Limestone Division, U. S. Steel Corporation, 308,734 man-hours without a disabling work injury.

Hillsville Quarry, Hillsville, Lawrence County, Pennsylvania, operated by Michigan Limestone Division, U. S. Steel Corporation, 254,372 man-hours without a disabling work injury.

Bessemer Quarry, Bessemer, Lawrence County, Pennsylvania, operated by Bessemer Limestone and Cement Company, 199,581 man-hours without a disabling work injury.

Alpena Quarry, Alpena, Alpena County, Michigan, operated by Huron Portland Cement Company, 192,351 man-hours without a disabling work injury.

# Explosives Help to Speed Fun in the Sun

## At New Port Richey, Florida, a modern community designed for zestful living is rapidly nearing completion on the state's Sun Coast

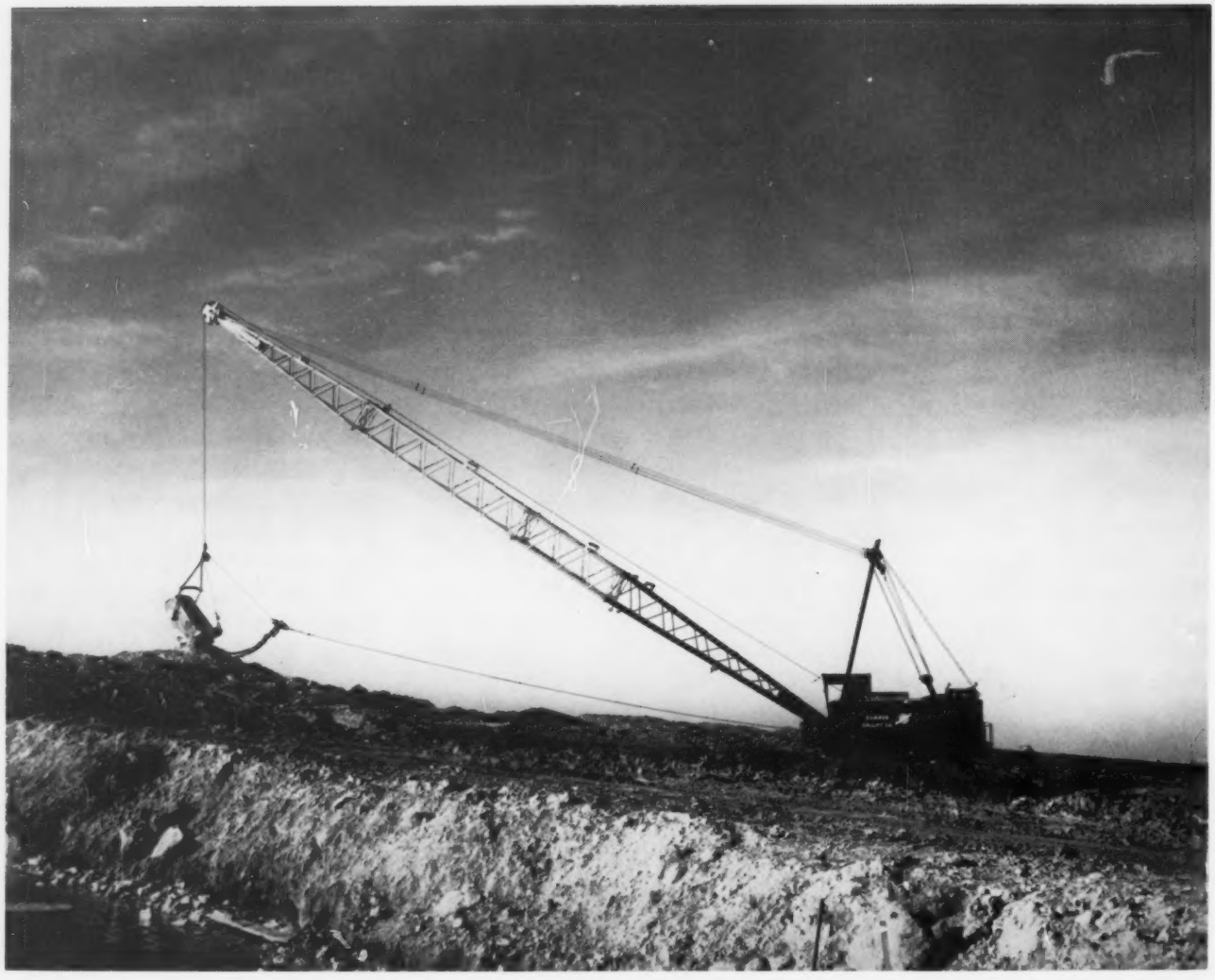
C. F. ARGO*

EVERY week, it is estimated, 3,000 families move to Florida to make their homes. They come from all walks of life, from every state in the Union, and some even come from foreign countries. Some are retired and come to the Sunshine State to enjoy, during their golden years, the many natural recreational facilities that abound in Florida; but many are younger people seeking a new and more abundant life in Florida's fast-moving and ever-growing industrial development. The last decade has seen the population double; building has reached a peak never before seen in Florida. With the rising tide of building has come a tremendous development of the natural resources of the state. Many men have looked to the future and planned for this expansion, but none more completely than the men who founded the Flor-a-mar Development Corporation on July 24, 1958.

At New Port Richey, Florida, on the Gulf of Mexico, over 3,000 acres of coastal land are being developed by Flor-a-mar, and over 10,000 homes, to

*Hercules Powder Company
Birmingham, Alabama

**THE START: A Model 500 Mayhew rotary drill makes 4¾-in. holes for blasting a canal in the Flor-a-mar development. The blasted material, which consists of clay, hard limestone, and soft limerock, will be used to fill the low areas.**



**DRAGLINE EXCAVATION: A 200-ft.-wide canal is being excavated by a Model 4500 Manitowoc dragline. The canal will act as a waterway to the Gulf of Mexico. Excavated material is stockpiled along the canal banks until needed as fill.**

fit almost every economic level, are being constructed. Along with the homes, designed for comfort and pleasant living, the development plans also call for a gigantic resort complex consisting of hotels, motels, garden apartments, yacht clubs, and national corporation retirement facilities. Such retirement facilities are in demand by many large companies, union organizations, and national foundations to meet the needs of the increasing number of their retiring personnel. The Flor-a-mar project is designed primarily for this group, but the door is not closed to others who might want to participate in the advantages of gracious living offered in this development with every convenience.

### Recreation Unlimited

It would be difficult to choose a location for a development such as this which would offer a more complete picture of the vacation atmosphere. Flor-a-mar, on U. S. Highway 19, is directly on the Gulf of Mexico, about 20 miles north of Clearwater, Florida. This highway is the AAA routing for tourists traveling along the west coast of Florida. The historic town of Tarpon Springs, 8 miles to the south, is famous for its early Greek settlement and the production of sponges. A few miles farther south are the larger cities of Tampa and St. Petersburg, which offer the variety of activities common to Florida's "Sun Coast." Eleven airlines operating out of these cities provide service to all parts of the world. A few miles inland is the heart of the Nation's citrus industry, as well as the many attractions that bring millions of people to the state each year. Some of these nearby alluring spots are Silver Springs at Ocala, Cyprus Gardens at Winter Haven, and the beautiful Bok Singing Tower at Lake Wales.

Recreational facilities are, to a great degree, supplied by nature. A popular pastime is ocean- and fresh-water fishing. In the Gulf, tarpon and red fish are plentiful, and the numerous lakes furnish perch and record-size bass. Good hunting is only a short distance away, and deer and wild turkeys are found in abundance. The weather is seldom disagreeable, and golf, boat-

ing, and swimming are year-round sports at Flor-a-mar.

### Development Details

Actual construction of the new development began June 1, 1959, when the Sumner Sollitt Company of Chicago, Illinois, moved in to expedite the work of developing the 3,000 acres of coastal plains. The immensity of the project may be seen from this listing of the major work items: 106 miles of sewers, 100 miles of streets, 60 miles of canals, 100 miles of sea wall, 10,000 to 12,000 homes, numerous hotels and motels, garden apartments, gulf beaches, complete drainage, landscaping, and public utilities. In addition, there are these proposed recreational facilities: two golf courses, one country club, three yacht clubs, complete docking facilities, marinas, and parks.

The Sumner Sollitt Company was founded over 120 years ago. When newly established, its activities were confined to the Chicago area; however, today its activities are not only nationwide but are international in scope.

### Geological Formation

In general, the area lies on a level coastal plain, situated on a solid limestone stratum, 98% of which meets all road-building specifications. After elevation of this land is accomplished, it will be dry and high above the natural and man-made waterways which empty into the Gulf of Mexico. The formation consists of alternating layers of hard limestone, a stratum of limestone boulders, a layer of clay, and bottoming out with a deposit of lime rock of very high calcium carbonate content.

### Drilling and Blasting

To build the extensive system of canals requires the use of explosives in rather heavy charges. These heavy charges pulverize the hard limestone, which is then excavated by large drag-

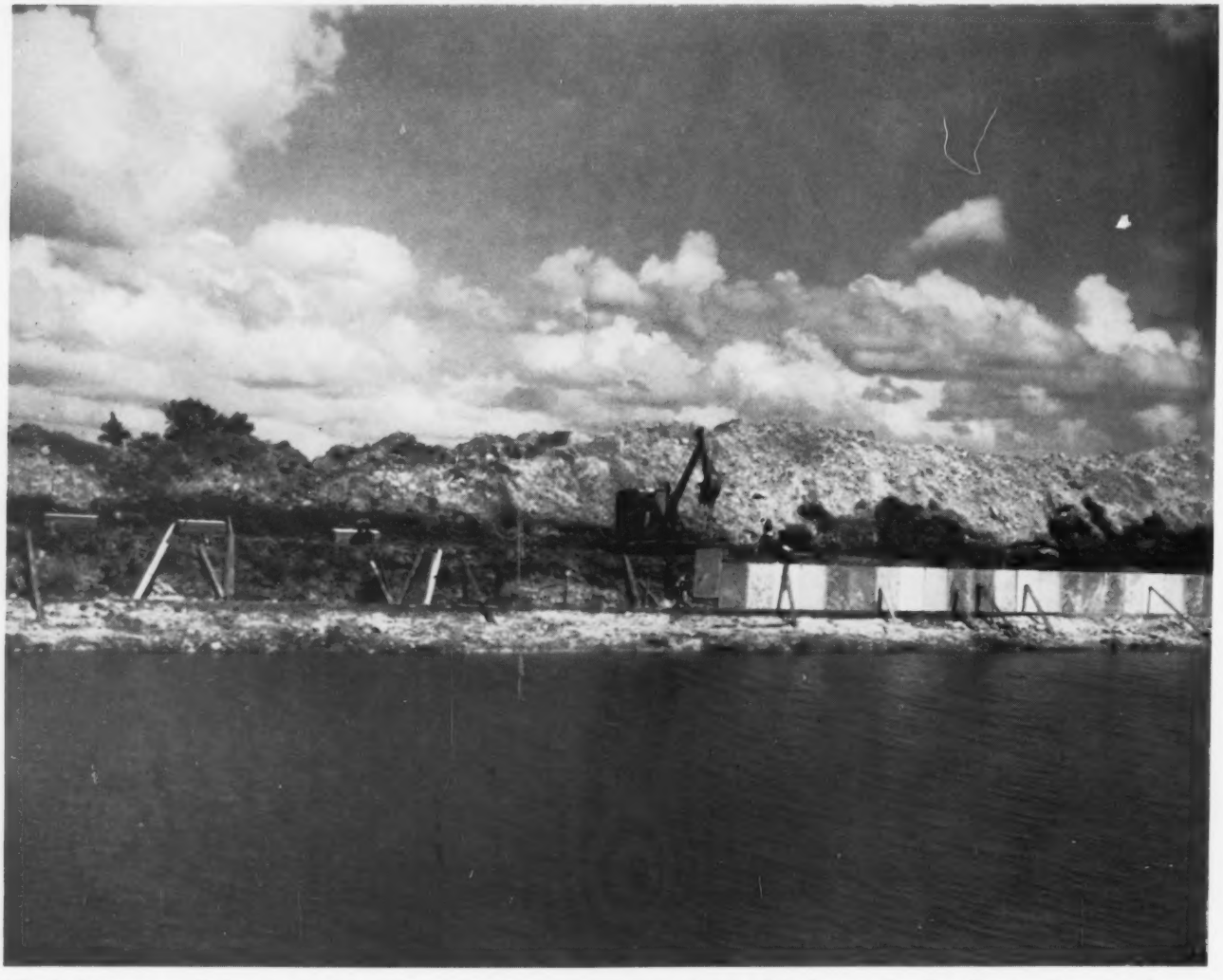
**BLASTERS: Drilling and blasting activities on the Flor-a-mar development are in charge of Foreman Edgar Ledford and Arthur M. Rickart, assistant foreman. Spiralok cartridges were used to assure proper powder distribution in the bore hole.**

lines. Blast holes are made by four drills working in different areas where the formation is best suited to the particular type of drill chosen. In use is a Model 500 Mayhew rotary drill mounted on a Model 1911 Athey wagon. This unit is moved from place to place as needed by a D-4 Caterpillar tractor. The unit is equipped with a 300-c.f.m. Gardner-Denver air compressor and it is also outfitted with a G. D. piston pump for furnishing water when necessary. The drill mast is 24 ft. high and will accommodate a 20-ft. length of drill steel. A 4¾-in. tricone bit is used. Also in use are two Model 123J Gardner-Denver drills mounted on D-6 Caterpillar tractors with cleated tracks, using 16-ft. drill steel and 3½-in. Timken rock bits. A Model 123PR Gardner-Denver drill mounted on either a drill barge or a D-4 Caterpillar, and using 16-ft. steel and 3½-in. Timken rock bits, is also available. A Model TDL Joy travel drill using 12-ft. steel and 3½-in. bits completes the array.

Air is supplied for the pneumatic drills by 600-c.f.m. Gardner-Denver and Jaeger air compressors.

The small amount of necessary secondary drilling is done with Le Roi and Thor jackhammers. Drill speed on all units is considered excellent, with production running at about 1,800 ft. per shift, using three drills. Bit life is not a major expense because of the unabrasive qualities of the rock.

Holes are drilled to a depth of 16 ft. on a 7 by 7-ft. spacing in a short-period delay pattern. Each row of holes is delayed either toward a buffer or an open face. Excavation procedure is carried out so that one-half of the 200-ft.-wide canals is excavated at a time. Extraordinary stratification of clay, hard limestone, soft lime rock, and a severe water condition make the actual hole size inconsistent. As individual cartridges will not always stand up in the bore hole because of water conditions, Spiralok® cartridges are used to assure proper powder distribution in the bore hole. The use of Spiralok makes it possible to join cartridges of explosives into a rigid column of any reasonable length.



**SEA WALL: A sea wall along the north bank of a canal will assure permanent retention of the bank. Sea walls will protect the over 100 miles of waterways in the development.**

**NEARING COMPLETION: This view shows some of the completed homes on the south bank of one of the canals which lead to the Gulf. Five such canals are being constructed, with dozens of intersecting intermediate canals—a perfect setting for fun in the sun.**

A typical hole is loaded with three cartridges of Hercol® 2, 2 by 24 in., and two cartridges of Hercules® Extra Dynamite 40%, 2 by 24 in. The primers are Hercules® Electric Blasting Caps and No-Vent® Short-Period Delay Electric Caps with 16-ft. plastic-insulated copper leg wires. Using series-in-parallel connections, the caps are detonated with a Titan* blaster, firing 50 to 150 caps at a time. About 2 cu. yd. of rock is produced for each pound of explosives used. The nature of the rock located at the 16-ft. depth allows about 2 ft. of overdigging in most canals. After exhaustive trials and experiments, this blasting pattern was developed, and results in good blasting in this difficult formation. A high percentage of the blasted material is used without further preparation in the construction of roads throughout the development.

*Hercules Trademark

### Excavation

After the blast, the material to be used for roads and fill is removed by dragline and stockpiled along the canal for distribution wherever land elevation is necessary for protection against the varying tides. Excavation of these large amounts of materials is accomplished by: one Model 4500 Manitowoc dragline, with a 140-ft. boom and a 5-cu. yd. bucket; one Model 3900 Manitowoc dragline, with a 100-ft. boom and a 4-cu. yd. bucket; one Model 605 Koehring dragline, with a 2-cu. yd. bucket; one Model 362 Marion dragline with a 1¾-cu. yd. bucket; and a Model 6 Northwest dragline equipped with a 1¾-cu. yd. bucket.

The blasted fill material is distributed over the areas that require elevation by the following heavy-hauling equipment: five LeTourneau-Westinghouse 11-ton back-dump trucks; two Army 6 by 6 wheel drive trucks, 11-cu. yd. capacity; two Model D-8 Caterpillar tractors; two Model TD-15 International tractors; two Model D-4 Caterpillar tractors; and many pieces of smaller equipment.

### Company Personnel

The leaders in this five to seven-year development program are the officers in the Flor-a-mar Development Corporation, of which Howard A. Burkland of New Port Richey is president, Sumner Sollitt of Chicago is treasurer, and Robert G. Fyr of Clearwater, Florida, is vice president and secretary. The local activities of Sumner Sollitt are directed by Robert G. Fyr, project superintendent, and Phillip F. Moran, general superintendent.

Flor-a-mar is not merely a place to be heard about and discussed. It is a place to see, to visit, to enjoy.

# Mining in the Coalburg Seam

## This high seam of coal permits the use of large mining equipment and modern techniques for more efficient production

W. E. CRAIGO*

ALTHOUGH the Youghiogheny and Ohio Coal Company has just recently opened a new bituminous mine in West Virginia, this company is by no means a Johnny-come-lately to the state. The new operation, known as No. 2 Mine, is the third coal mine opened in this area by the company since it began mining in the vicinity of Van in 1920. This original mine was worked out in 1937 and mining activities were transferred at that time to a new mine, designated No. 1, which incidentally is still producing coal.

*Hercules Powder Company
Pittsburgh, Pennsylvania

Van, in Boone County, West Virginia, is one of the many mining towns located in the mountainous regions of the southwestern part of this leading coal-producing state. It is on West Virginia State route 78, about 60 miles south of Charleston, the state capital, and is served by the Chesapeake & Ohio Railroad. Van is a progressive community of approximately 1,000 population; it is served by several churches and has excellent school facilities.

The new No. 2 Mine was opened in 1959 and is producing coal from the Coalburg seam. It is a drift mine located approximately 800 ft. above the floor of the valley. Access to the mine is by a company-constructed road that winds around the mountainside until it reaches the mine site. The road was built on a 5% grade, and all maintenance work is done by employes of the coal company.

### High-Seam Coal

The Coalburg seam, in the No. 2 Mine area, ranges in height from 8 to 10 ft. It is a good grade of coal with a low ash and sulfur content, which makes it an excellent coal for almost any use. Most of the high-seam coal

CLEANING PLANT: This modern, completely automatic cleaning facility is capable of preparing 3,000 tons of coal per shift. The railroad spur connects with the Chesapeake & Ohio Railroad.

**ROOF BOLTING: The start of a production cycle begins with the roof-bolting machines, making the area safe for the workers. Bolts are set to a depth of 5 ft., on a 4 by 5-ft. spacing. Under normal conditions, roof bolting eliminated the need for timbering.**

in this section was worked out many years ago, and this property is unique for the height of its seam, which makes possible the use of large mining equipment for more efficient results.

The No. 2 Mine is composed of three sections that work two 8-hr. shifts per day. Two of these sections are conventional and use 11 BU Joy loading machines, while the third section employs the continuous mining procedure. Most of the coal produced by Youghiogheny and Ohio at Van comes from these three sections of No. 2 Mine, although the No. 1 Mine still produces a small amount of coal.

A typical cycle on one of the conventional sections finds the roof-bolting machine placing roof bolts to make the area safe. The Fletcher bolting machine drills holes in the roof to a depth of 5 ft., and a 5-ft. roof bolt is used. The spacing of the bolts is normally 4 by 5 ft. The roof-bolting procedure has proved very successful and has eliminated the need for tim-

**LOADING: After the cutting machine makes its cuts and the holes are drilled, the shooter loads the six holes with Red H A, size 1¼ by 20-in. permissible explosives. Four holes are in the bottom of the cut and two in the top ribs.**

STORAGE PIT: The coal, as it comes from the mine by conveyor belt, is dumped into a storage pit, where it remains until hauled to the cleaning plant. The cleaned coal is screened to various sizes and loaded into railroad cars for shipment to customers.

INSPECTION: Vaughan Zickafoose, general mine foreman, and Paul Hull, foreman at Number 2 Mine, inspect the coal as it speeds by on the haulage belt.

bering under normal conditions. After the roof bolting has been completed, the cutting machine moves in to cut the place. A Jeffrey 29 UR cutting machine makes a 6-in. cut in the middle of the seam and a 6-in. shear in the middle of the place. The places are cut to a depth of 8 ft. and are driven 16 ft. wide.

### Mining Procedure

Drilling in the coal face is done with a butterfly drill, with a total of six holes drilled in each cut. Four holes are drilled in the bottom of the cut and the two remaining holes are made in the top ribs. All holes are drilled to a depth of 8 ft. The holes are charged with cartridges of Red H® A, size 1¼ by 20 in., permissible explosives. The four bottom holes are fired first and the top rib holes are fired last. Detonation is by a 10-shot battery. Holes are stemmed with clay and a gas test is taken before and after each blast is made.

The blasted coal is now ready for the loading machine, and ease of loading of the coal is such that the normal cycle is repeated about 16 times per shift. The coal is loaded into 10-ton-capacity shuttle cars and hauled to the belt-loading point. The loading point is arranged so that three shuttle cars can dump at the same time. By use of an inverted trolley wire, the shuttle cars can haul for a mile before it is necessary to move up their cable.

The haulage is by belt all the way from the dumping point to outside the mine. The butt entry belt is a 36-in. rope belt. This dumps the coal onto a 42-in. Uniflo Goodyear belt that hauls the coal to the outside. Once outside, the coal is dumped into a storage pit, where it remains until it is hauled to the cleaning plant. Mack trucks of 30-ton capacity haul the coal down the mountain road to the tipple. The road is also used by the men to travel to and from work in the mine. The lamp house and foreman's office are located at the terminus of the road near the mine entry.

After the coal has been hauled down the mountain and dumped into the tipple, a modern cleaning plant goes to work on it. The cleaning plant is completely automatic and can process 3,000 tons of coal per shift. The cleaned coal is then screened to various sizes and loaded into railroad cars for shipment to the consumers. The markets for this coal include export, steam, domestic, and industrial.

**KEY MAN: Glen Kitchen as superintendent of the operations of the Youghiogheny and Ohio properties at Van, West Virginia, is responsible for their efficient conduct.**

The sized rejects from the cleaning plant are trucked to a spoil area, while the fines are pumped to a settlement pit to drain. This avoids polluting local streams with cleaning plant rejects.

### Personnel

The labor force is obtained from local sources and very little turnover is experienced. Many of the employes have spent their working lives with Youghiogheny and Ohio, having started when the company moved into the area. Most of the men own their own homes, having purchased them from the coal company. The company owned the whole community at one time. The company also operates a modern market and service station for the convenience of the employes.

The Youghiogheny and Ohio Coal Company also operates mines in the State of Ohio and has its home office in Cleveland.

W. M. Osburn, Sr., is president; W. M. Osburn, Jr., is purchasing agent and directs all the buying for the company; both are located at the main office in Cleveland. J. D. Sauters is the general manager of mines and is in the operations office at Martins Ferry, Ohio. On the local level, Glen Kitchen is mine superintendent of the Van operation, and the general mine foreman is Vaughan Zickafoose.

**HOME SWEET HOME: Most of the employes own their homes, having purchased them from the company. That they take great pride in their properties is evidenced by the Christmas decorations that lend a holiday touch.**

# NEWS NOTES

### IMPROVED CRANE-EXCAVATOR

A bulletin recently published by Bucyrus-Erie lists 56 improvements on the company's Model 88-B Series Two crane-excavator. The 88-B is fully convertible for crane, dragline, clamshell, shovel, or stripping-shovel operations.

The company states that notable improvements have been made on the machine's revolving frame, deck machinery, power units, air controls, crawlers, and shovel, crane, clamshell, dragline front ends. As a shovel, the 88-B Series Two is equipped with 5-cu. yd. dippers; as a dragline, from 4 to 7-cu. yd. buckets; and as a clamshell, 4 to 6-cu. yd. buckets.

For complete information, write to Bucyrus-Erie Co., South Milwaukee, Wisconsin.

### VIBRATING SCREEN BULLETIN

Syntron Company announces the publication of a 32-page bulletin on vibrating screens.

Complete descriptions, data, and specifications, along with over 50 illustrations, are presented. Rotary vibrator screens, grizzly bar screens, screening feeders, mechanical conveyor screens, and pulsating magnet screens are described in detail.

Copies of the bulletin are available upon request to Syntron Company, 1206 Lexington Avenue, Homer City, Pennsylvania.

### NEW PLUG HOLE DRILL

Introduction to the market of a new plug hole drill was recently announced by Atlas Copco, Inc., manufacturer of compressed air equipment. Weighing less than 6½ lb., with an overall length of only 14 in., this machine, according to the manufacturer, is the lightest, smallest pneumatic plug hole drill with self-rotation in the world. Low air consumption, air flushing, and high drilling rate are but a few of the outstanding features of this machine. Additional information may be obtained from Atlas Copco, Inc., 545 Fifth Avenue, New York 17, New York.

### ERIE STRAYER CATALOG

A catalog describing clamshell buckets, grabs, and grapples has just been issued by Erie Strayer Co. The 50-page book includes data on how to choose the proper clamshell bucket and tables showing the relationship of Erie buckets to weights of materials and sizes of cranes. For a free copy, write for Bulletin No. 2L-60, Erie Strayer Co., Rudolph Avenue, Erie, Pennsylvania.

### HUGE-HAUL SYSTEMS BULLETIN

The Heil Co., Milwaukee 1, Wisconsin, describes its Huge-Haul detachable container system in a new six-page, two-color, fully illustrated bulletin, No. HH-61102. According to the manufacturer, it tells how one truck can become a fleet by using this system to store, pick up, carry, and dump materials of all kinds. Container capacities are up to 40 cu. yd.; handles loads to 30,000 lb. A copy of the bulletin may be obtained by writing to the manufacturer.

### TRACTOR SHOVEL BROCHURE

A specification bulletin describing the features of the new Model 114 Trojan tractor shovel has just been released by the Trojan Division of The Yale & Towne Manufacturing Company.

The manufacturer announces the new Trojan 114 has three interchangeable buckets, which give the machine a carrying capacity of from ¾ to 1⅜ cu. yd. and 25-m.p.h. road speed. A 6-ft. 4-in. tread and 7-ft. 4-in. wheelbase provide exceptional stability under the most difficult working conditions. Gasoline or diesel operation is available through two engine options. The two-page color bulletin, which lists the standard and optional equipment for this unit, is available from any Trojan distributor, or from The Yale & Towne Manufacturing Company, Trojan Division, Batavia, New York.

### DRILLING RIGS BOOKLETS

Ingersoll-Rand has available a new 20-page booklet, covering special rock-drilling rigs for construction, mining, tunneling, and submarine work. The booklet shows many on-the-job photos of special rigs engineered to meet the exact requirements of each job. According to the manufacturer, the booklet is designed to show how contractors and mine operators can create special drilling rigs to meet their own particular problems by using Ingersoll-Rand drilling components.

For a copy of the booklet or further information, write to Ingersoll-Rand Co., 11 Broadway, New York 4, New York, requesting Form 4215.

### RUBBER PRODUCTS CATALOG

Cincinnati Rubber Manufacturing Co. has issued a 60-page catalog describing many of its rubber-line products.

Divided into sections on belting, hose, molded products, and rubber specialties, the catalog is designed to provide the maximum in technical information. It contains extensive data sections giving detailed information on the products listed.

The catalog may be obtained by writing to Cincinnati Rubber Manufacturing Co., 4900 Franklin Avenue (Norwood), Cincinnati 12, Ohio.

### EMERGENCY LIGHTING CATALOG

An eight-page catalog covering Light Warden emergency lighting equipment is now available from Electric Cord Company, 432 Plane Street, Newark, New Jersey. The catalog provides operating data and prices on the line of fully automatic, battery-operated emergency lighting fixtures. According to the manufacturer, the lighting equipment is designed to operate instantly in the event of electric power failure. It is fully guaranteed for five years, with battery guarantees up to 15 years.

### MICRO SWITCH CATALOG

A 20-page catalog, covering a representative selection of products from the complete Micro Switch line of precision switches for industrial, commercial, data processing, airborne, and electronic applications, is now available from Micro Switch, Freeport, Illinois, a division of Minneapolis-Honeywell Regulator Company. Designated Catalog 104, it has photos and condensed descriptions of over 200 items, including miniature switches, special-purpose switches, electronic switch-circuit assemblies, lighted pushbutton switches, toggle switches, limit switches, proximity switches, and mercury switches.

### POWER-TRANSMISSION UNITS BROCHURE

The complete line of Ka-Mo earth- and rock-boring power transmission units, auger sections, and accessories is illustrated and described in a 12-page brochure released by the Ka-Mo Tools Department of Kwik-Mix Co., division of Koehring Co., Port Washington, Wisconsin.

The new two-color brochure covers Ka-Mo's air-, hydraulic-, electric-, and gasoline-powered boring units, cutting heads, augers, feed tracks, and other accessories. Each model in the line is listed along with condensed specifications for that model. Also included is a description of the many types of cutting heads available. Copies are available from the Kwik-Mix Co.

### CARBIDE-TIPPED BIT CHART

Vascoloy-Ramet Corp. has recently issued a folder covering its line of carbide-tipped bits. A chart indicating specifications and performance aids in the selection of the proper bit. Copies may be obtained by writing the company at 800 Market Street, Waukegan, Illinois.

### LUBRICATION MANUAL

A 24-page case history of how a centralized lubrication system serves all equipment and machinery at a large plant is available from Alemite Division, Stewart-Warner Corporation, 1826 Diversey Parkway, Chicago, Illinois.

### THERMAL DRYER

Complete particulars about a thermal dryer are supplied by a 16-page booklet recently made available by McNally Pittsburg Manufacturing Co. of Pittsburg, Kansas. According to the bulletin, the dryer is simple in design and gives constant temperature control at low hp. requirements. Grate openings are adjustable by sections. Copies of the bulletin are available without charge.

### CONVEYOR BELT HANDBOOK

A 28-page handbook detailing belt conveyor practices recommended by NEMA Standards may be obtained from Hewitt-Robins, Inc., of Stamford, Connecticut. Also is included a tabulation of maintenance problems with their cause and suggested remedies.

### LIGHT PICK-UP PUMPS

A new line of light pick-up pumps designed to include openings ¾ and 1 in. on both suction and discharge is available from Rice Pump & Machine Company. The pumps of ¾-in. opening handle to 1,500 g.p.h. and the capacities on the 1-in. range to 2,400 g.p.h. Aluminum construction has reduced overall weights; scaling down to new lows of 18 lb. without power and on up to 43 lb. with 2-hp., air-cooled gasoline engine. There are ten models to choose from. New descriptive bulletin CP1-28 may be obtained direct from Rice Pump & Machine Company, Belgium, Wisconsin.

### MINING SYMPOSIUM

The 23rd Annual Mining Symposium of the University of Minnesota and the Annual Meeting of the Minnesota Section of AIME will be held jointly, as usual, in Duluth from January 15 to 17, 1962. The three-day program is sponsored by the School of Mines and Metallurgy and the Center for Continuation Study of the University, in cooperation with the local section of the American Institute of Mining, Metallurgical and Petroleum Engineers. It will be attended by some 750 leaders of the iron ore mining industry and will feature some 20 technical papers at six sessions.

Details regarding the program and registration may be obtained by writing the director, Center for Continuation Study, University of Minnesota, Minneapolis 14, Minnesota.

## BLAST HOLE PROBLEM:

**U. S. BORAX, BORON, CALIFORNIA**

## BLAST DRILL MUST:

- produce 30-50′ deep 7⅜″ blast holes for overburden stripping
- Produce 31′ deep 4¾″ holes in the ore body
- produce 100′ deep 4¾″ exploration holes
- produce a minimum of 1,000′ blast holes per shift
- be able to move swiftly from ore area in deep pit to over-burden area at ground level.

**SOLUTION:** *PORTADRILL* diesel powered, Model 505B mounted on tandem axle truck. Unit includes 2-stage high pressure air system with cross-over to operate as two single stages (500 cfm @ 100 p.s.i. or 640 cfm @ 40 p.s.i.) 38′ mast; 33′x5″ dia. drilling bar (kelly); 33′x3½″ dia. drilling bar with travelling steady bearing; 20′ length of 5″ dia. drill steel and 4-20′ lengths of 3¼″ dia. drill steel; rack to carry drill steels and pipe handling and power break-out tools for both sizes.

**RESULT:** Drill unit performs ALL drilling requirements with 2-man crew. 31′ blast holes are drilled in 12 minutes. One man operates the drill unit while the second man remains in the truck cab, ready to move the drill as each hole is completed. Interchange of duties between the two men relieves fatigue and maintains two trained operators.

*An outstanding PORTADRILL advantage is that each unit may be completely customized to meet YOUR blast hole requirements . . . 8 Portadrill models for 3½″ to 9″ dia. holes are available. Inquiries Welcome.*

**PORTADRILL**

REG. U.S. PAT. OFF.

***Mfg. by the Winter-Weiss Co.*** **2201 Blake St. Denver 5, Colorado, U.S.A.**

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VIBRA-TECH ENGINEERS, INC.

is pleased to announce
the appointment of

**ROBERT B. BANNING, P.E.**

Consulting Engineer

597 N.W. 110th STREET, MIAMI

PLaza 1-6581

as its Florida representative.

With more than 20 years of engineering experience in structures, foundations, blasting control surveys and testing, Mr. Banning is well known in Florida, and eminently qualified to apply Vibra-Tech's specialized professional services and instrumentation to the problems caused by blasting effects, vibration and concussion.

We feel Mr. Banning's appointment will be of constructive service to the quarry, mining and contracting industries of Florida as well as engineering firms, insurance companies, and attorneys.

Vibra-Tech Engineers, Inc.

Hazleton, Pa.

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*Prevent!*

DYNAMITE BLAST VIBRATION

- DAMAGE
- COMPLAINTS, DELAYS
- UNJUST LAW SUITS, LOSSES

*with your own*

**BLASTCORDER**

- Designed especially for dynamiters.
- Even a housewife can understand the vibration reading on the meter. Meter helps blaster keep shots safe. Makes impressive demonstration indoors and outdoors to maintain good community relations.
- Pushing 2 buttons makes an immediate 4 x 5 record scaled like the meter — no photo processing, no delays, no computations. Helps satisfy complaints on the spot and prevent law suits. Invaluable permanent record for evidence.
- Rugged for field use. Weighs 20 pounds with batteries. Dimensions: 6 x 12 x 19 inches.
- Price: 1-component model $1225; 3-component model $1800. Records 30 cents each.

GEOTECH

The Geotechnical Corporation
3401 Shiloh Road, Garland, Texas
Phone BR 8-8102

# JOY
has the right
# DRILL for

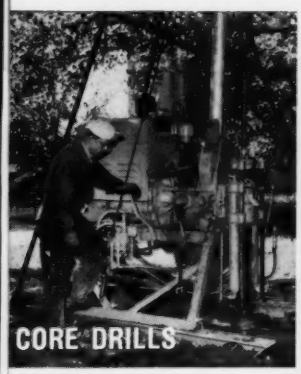
## CORE
## TRUCK MOUNTED
## CHAMPION
## CHALLENGER
## TRAC DRILLS
## DRILLMOBILE
## HAND HELD

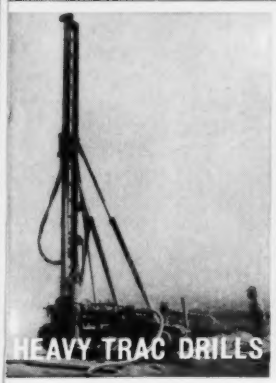
Drilling costs can be kept down only by carefully matching the drill to the job. With the experience gained in working with the industry's most complete range of drills, your Joy representative can show you how to cut drilling costs to the absolute minimum. For blast holes up to 12¼", he can furnish the drill and mounting which represent the proper combination of production efficiency and equipment investment to handle your job at the lowest possible cost.

# every job

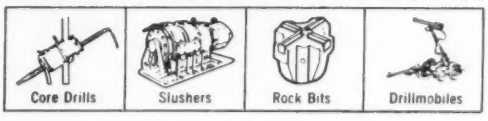
For small jobs, Joy can furnish hand-held or air leg drills with low equipment costs. Mass production of medium-sized holes can best be handled by one of the five types of Joy Trac-Drills, which provide as little or as much in the way of power controls as is justified by your operation. Where rotary drilling is practical, Joy truck-mounted drills will be the economical answer. Big blast holes can usually be drilled most economically with the big Joy Champion Rotary Drills. For underground drilling there is a complete line of Joy drills, jibs, feeds and mountings.

See your Joy representative whenever you have a drilling job to be done. He can give you the right equipment at the right price to keep drilling costs down. For more complete information on the Joy line of drills, write for Bulletin 3331-5.





EQUIPMENT FOR MINING ... FOR ALL INDUSTRY




**JOY**

**Joy Manufacturing Company**
**Oliver Building, Pittsburgh 22, Pa.**

In Canada: Joy Manufacturing Company (Canada) Limited, Galt, Ontario

# Drillmaster Does Double-Duty at Anaconda's RAINBOW VEIN

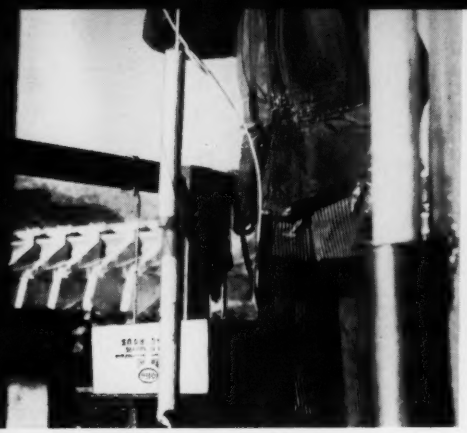
*This one heavy-duty rig is used for both rotary and percussion drilling in varying rock formations*

To drill blast holes through radically changing rock formations at the Anaconda Company's Rainbow Vein open pit zinc mine in Butte, Montana, the F & S Contracting Co. has had to use both rotary and percussion drilling. And *both* jobs are being done to excellent advantage with the versatile I-R Drillmaster shown above. For much of the overburden, roller-cone rotary bits are used. And in the harder layers overlaying the deep, narrow Rainbow Vein, which contains zinc and lead sulphides with values of gold and silver, the rotary bits are replaced with an I-R Downhole Drill for percussion drilling, using the same rotary head for drill rotation. Holes are drilled 42 ft deep with 6¼" bits on 15 to 18 ft spacing and loaded with fertilizer grade ammonium nitrate with diesel oil.

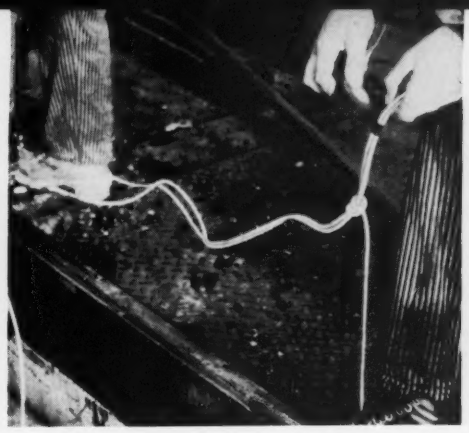
If you want top drilling speed and efficiency in *any kind of ground*, check the cost-saving advantages of the versatile I-R Drillmaster. Ask your I-R representative for complete details.

**Ingersoll-Rand**
72A5 ♥ 11 Broadway, New York 4, N.Y.

*A CONSTANT STANDARD OF QUALITY IN EVERYTHING YOU NEED FOR DRILLING ROCK*



Primacord was threaded through two 2" x 16" powder sticks. Charge was lowered through white aluminum tube shown protruding from iron pipe and then tamped into place. Plastic reinforced Primacord proved ideal for use as the downlines because of its ruggedness and water-resistant characteristics.



Working on the barge, a double line of Reinforced Primacord was laid out for the trunklines. Picture shows how tightly the single Plastic Reinforced Primacord downline was knotted. In spite of near-freezing weather, Primacord was readily pliable, and knots were easily tied. For extra security, the trunkline was taped.

After the downlines were tied in position, the Primacord trunkline was well weighted with rock at each end and lowered to the river bottom. Drilling, loading and stemming were done through a sand pot. Holes were 4′-4½″ and were at 5′ to 8′ centers, depending on the estimated rock conditions and depth.

# PRIMACORD®

## helps solve underwater blasting problem and stray electric currents danger for Merritt, Chapman & Scott

The Priest Rapids dam is located on the Columbia River in the Ellensburg-Ephrata area of Washington State, about 200 miles downstream from the famous Grand Coulee. Excavation of the power plant discharge channel could not be completed while the area was dry. Consequently, the rock breaking and excavation had to be done underwater, working from barges.

To add to the problem, the river current averaged approximately 5 miles per hour. The bottom was uneven, ranging from five to thirteen feet. The power plant was immediately adjacent and limited the size of the individual shots. And the danger of premature explosion caused by stray electric currents was increased by the needed electrical equipment on the barges.

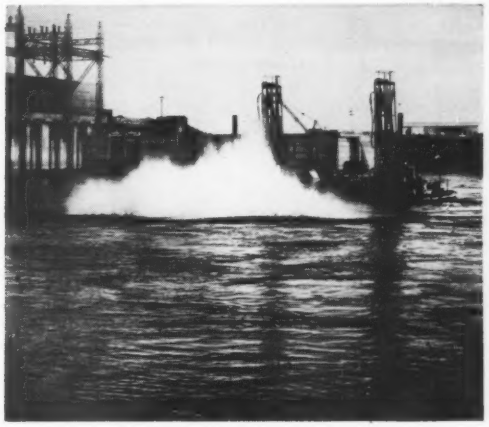
The problem was solved by using a double line of Reinforced Primacord Detonating Fuse for the trunklines and Plastic Reinforced Primacord for the downlines.

Primacord is so often the answer to difficult situations because of its many unique qualities. Primacord cannot be set off by stray electric currents — or by normal vibration, friction or shock. It is less sensitive than the explosive itself . . . detonates at a speed of almost four miles a second along its entire length . . . has a minimum initiating strength of a blasting cap at all points. It is simple, easy and *economical* to use.

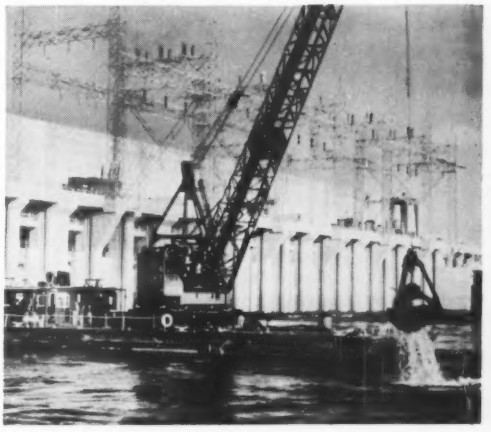
These advantages make Primacord ideal for a wide range of underground as well as underwater blasting. And for primary and secondary pit blasting, too. Primacord is available in a number of standard and special types developed to meet varying needs. For further information, consult your explosives supplier or write

**THE ENSIGN-BICKFORD COMPANY**
Simsbury, Connecticut • Since 1836

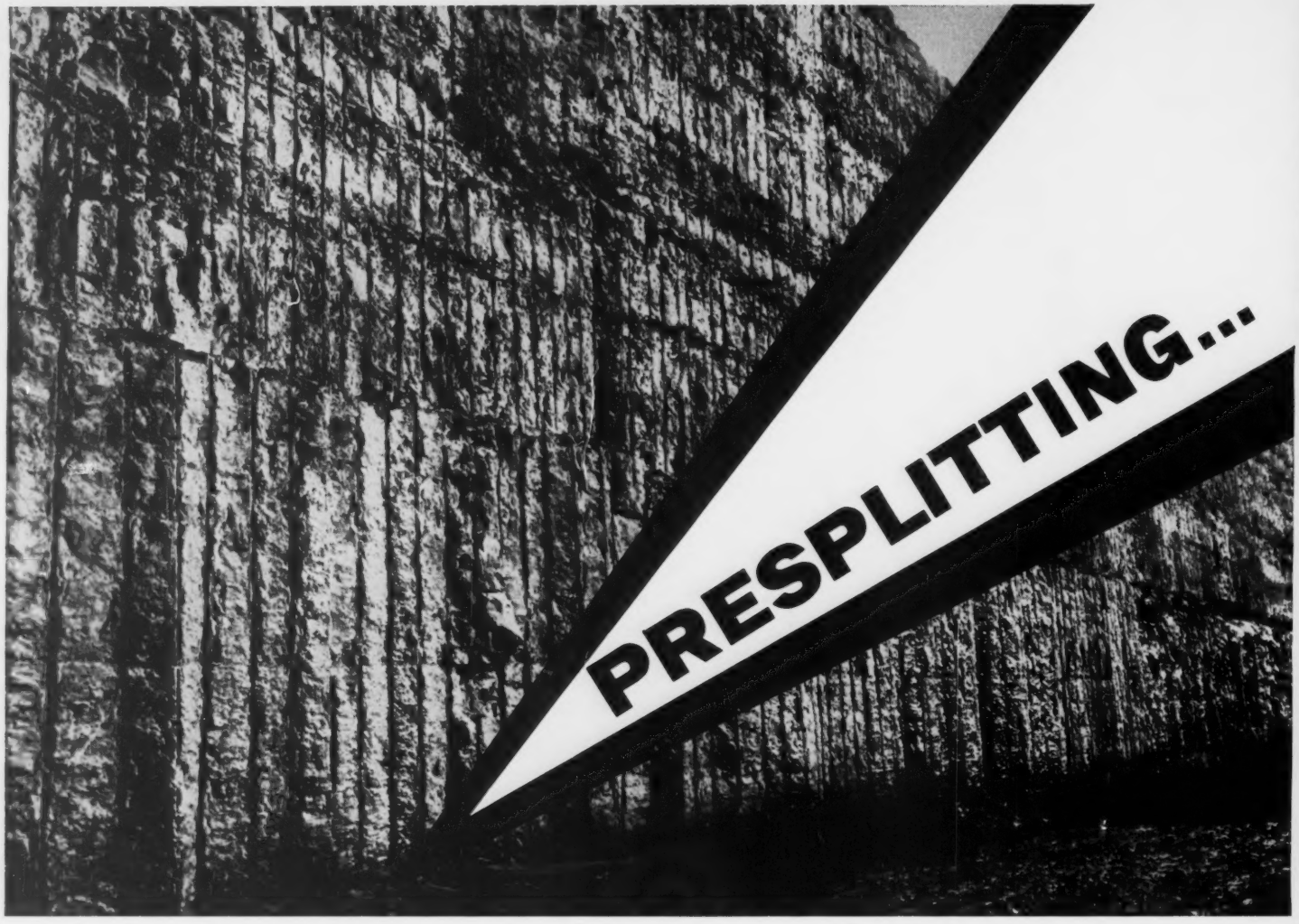
**THERE IS A TYPE OF PRIMACORD® FOR EVERY TYPE OF BLASTING**



Effect of a light nine-hole blast. Drill barge has moved back. Nearness of dam and high-tension electric lines is clearly shown. The shot was fired using two electric blasting caps which were attached at the **downstream** end of the trunkline to prevent any possibility of cutoffs.



Dredge barge moved in following blast. Clamshell conveyed the blasted rock to dragline from which the material was loaded directly into trucks. In this manner, the entire discharge channel was dredged out to the required depth.




## AN IMPORTANT NEW BLASTING TECHNIQUE PIONEERED BY HERCULES

PRESPLITTING is a forward step in the advancement of a more efficient blasting technique. This new method of controlled blasting, pioneered by Hercules Powder Company, produces "line-drilled" results without the excessively high costs of actual line drilling.

PRESPLITTING has the following advantages over normal methods of blasting:

**1.** Rock overbreak behind the PRESPLIT blast holes reduced to an absolute minimum—*less extra unpaid-for excavation and less concrete required because excess overbreak is eliminated.*

**2.** Fewer blast holes required than for line drilling—*extra dollar savings in drilling costs.*

**3.** Reduction in ground vibrations from primary blasting—*fewer complaints from nearby householders and industries.*

**4.** Sheer, clean rock wall obtained—*greatly reduced scaling time.*

**5.** Back shattering reduced—*much safer wall to work under; walls require less maintenance.*

**6.** Entire cut may be PRESPLIT with one blast—*saves resetting up time.*

Detailed technical information about PRESPLITTING is available in bulletin form. Ask your Hercules representative for a copy and learn how PRESPLITTING will reduce costs on your job.

*Explosives Department*

*HERCULES POWDER COMPANY*

INCORPORATED

*Hercules Tower, 910 Market Street, Wilmington 99, Delaware*

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